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The Mysore Agricultural Journal

(The Organ of the Mysore Agricultural and Experimental Union)

Vol. XX] 1941—42 [No. 4

IN THIS ISSUE

Grow More Paddy.

Improvement of *Doddahatti* Cottons in Mysore.

1942

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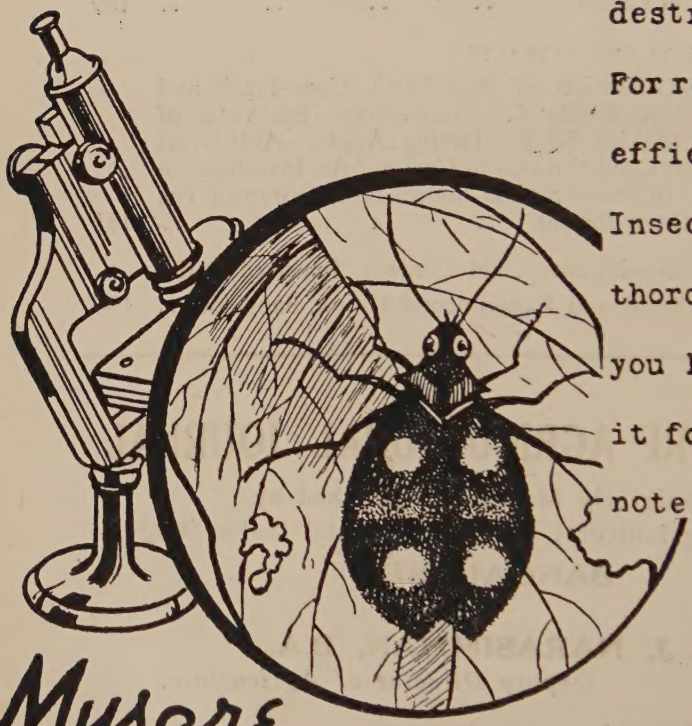

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EDITORIAL

Food Production in Mysore

" The question of increasing the production of food and fodder crops in the State has been engaging the earnest and anxious consideration of Government for some time past," states the *Mysore Information Bulletin*, in detailing the food production drive in Mysore, inaugurated by the Government. " The Committee appointed in October 1940 to investigate this question, stressed the need for increasing the output of paddy and *togari* and other pulses, for meeting local requirements."

Government have offered a number of concessions to the raiyats that more land may be taken up by them for producing food crops.

1. Lands under channels and tanks, are being given for temporary paddy cultivation for a period of three years, free of assessment in the first year and half assessment in second and third years.

2. Paddy cultivation on marshy lands is being encouraged by waiving the assessment, provided the raiyats do not utilise channel water directly for their fields.

3. Large extents of assessed waste, surrendered *Amrit Mahal kaval* and date reserves and other unoccupied cultivable lands also, are being given for dry cultivation similarly, rent free for the first year and with half assessment for the second and third years.

4. The persons bringing the lands under cultivation are given the option to purchase them at suitable upset price, at the end of the period of lease. The recent Government Order in this regard, directs that upset price be fixed so as not to exceed the market value of the land (inclusive of the contribution) at the time it is given for cultivation and that wherever possible, the upset price be intimated to the parties in advance, *i.e.*, when permission is given to cultivate the lands.

5. Portions of beds of all tanks which are beyond the water-margin, including the water-spread of the Krishnarajasagara, are proposed to be granted for *eksal* cultivation for growing vegetables, Bengalgram, jola, etc., in the dry season.

6. Improved varieties of seed and manure will be stocked and supplied by the Agricultural Department wherever necessary, subject to the cost being recovered after harvest.

Circular No. 66 of the Department of Agriculture, contains the recommendations of the Department with regard to the increase of production of paddy and is reproduced in this issue.

The Director of Agriculture in Mysore has summarised the measures arranged to be taken, in an article contributed to the *Mysore Economic Journal*, which are as follows:—

" (1) Increase of the area under paddy by about 30,000 acres in the Irwin Canal tract and the growing of 3-months' fine paddy, instead of the usual 5-months' *Coimbatore Sanna*, to utilise water economically for the production of paddy. A small increase is expected in the other districts, but it is not expected to be substantial.

" (2) Increase in the production per acre by the use of improved seeds and manures. Arrangements have been made for the issue of improved seeds of paddy, sufficient for one lakh of acres and manure, sufficient for 20,000 acres. This is expected to increase the yield by about 20 per cent. or, computed in terms of acreage yield, this is expected to increase paddy production by the equivalent of 20,000 acres. The total increase of production is thus estimated to be equivalent to about 50,000 acres as against the deficit equivalent to the production of one lakh of acres. This is a very substantial increase for food production if our arrangements materialise with the co-operation of raiyats. With special arrangements to secure whatever transport facilities are available to transport rice to Mysore from Bezwada, the situation is not without hope.

" (3) Mysore has always had a substantial exportable surplus of jola and has always been self-sufficient in respect of ragi, but still as some of the poorer rice-eaters may have to fall back upon ragi, steps have been taken to increase the area under ragi by surrendering thousands of acres of *Amrit Mahal kavals*, issue of *saguvali chits* immediately on demand, and concessional terms of assessment.

" The Department has obtained a grant of nearly four lakhs of rupees for the distribution of improved seeds and manures to raiyats and we hope to do our best. "

"Grow More Paddy"

(Department of Agriculture—Circular No. 66)

It is a matter of common knowledge that Mysore State does not produce the entire quantity of paddy required for consumption in the State. The average annual import of rice to Mysore State by rail, varies from ten to twenty lakhs of railway maunds per annum, valued at from sixty lakhs to one crore of rupees. This import is mainly derived from two sources. About one-third of the quantity imported every year comes from outside India (Burma, Thailand and Indo-China) through Madras ports and about two-third of the import comes from the Madras Presidency. The most important point to note now is that in the present war conditions no reliance can be placed on any imports from outside India. As regards imports from the Madras Presidency, it has to be remembered that Madras has been importing nearly seven crores of rupees worth of rice from outside for its own needs; transport difficulties over railway also stand in the way of import of rice from parts of Madras Presidency. It is thus obviously necessary that Mysore has to take steps to increase paddy production so as to meet the annual deficit of ten to twenty lakhs of railway maunds of rice roughly corresponding to ten to twenty lakhs of pallas of paddy. It is the foremost duty of the raiyats to produce enough food for the maintenance of the country's population. A few suggestions are made herein to indicate how the Mysore raiyat can rise himself equal to the situation and grow larger quantities of paddy required for the maintenance of his fellow-citizens.

Mysore has nearly 7½ lakhs of acres of paddy of which about one-fourth is rainfed in parts of the Shimoga, Kadur and Hassan Districts. To make up a deficit of 15 lakhs of pallas of paddy, Mysore raiyats have to grow two *pallas* more per acre of paddy land to make Mysore self-supporting in respect of paddy. There is no choice but to do it now on account of stoppage of import.

Experiments conducted for years in the Departmental Farms have clearly indicated this to be practicable in one or both of two ways, firstly by the substitution of improved seeds of paddy which yield more than the local ones and secondly by the judicious use of manures. During the last two or three years the Department has considerably expanded its activities for the distribution of improved seed and in view of the present emergent situation, every effort will be made to distribute improved seed over as large an area as practicable for the ensuing paddy cultivation. As regards manuring, the following measures are recommended :—

(1) Use of green manure, that is, leaves of *honge* and other green leaves in plenty.

(2) Where such green leaves are not available and where there is convenience for raising a green manure crop, raise a good green manure crop by sowing 30 seers of sunnhemp and 30 seers of cowpea per acre. This will give a very luxuriant crop of green manure to the extent of nearly 10,000 pounds per acre.

(3) Where neither of the above two is practicable, or in addition to the above two measures, it is recommended that a dose of 2 cwts. of groundnut cake powder and half cwt. of single superphosphate or steamed bonemeal may be used. These together cost only Rs. 8 to Rs. 10 per acre.

Experiments in the use of groundnut cake as manure carried on not only in Mysore State but even in other parts, have fully established the prospect of an increase of 20 to 30 per cent in the yield of paddy per acre. Paddy growers in Mysore, are therefore requested to resort to the use of one or both of two measures recommended above, namely, use of improved seed and application of manure. The Department of Agriculture, propose to arrange large supplies of groundunt cake and steamed bonemeal to paddy-growers.

A Statement is appended to this note giving a few typical instances of very appreciable increases in yield due to the adoption of improved varieties of paddy and manuring, as against local seed and no manure.

The economic use of water for paddy is very important. In the Mysore plateau with an average rainfall of only about 30 inches over the major part of the State, water is impounded at considerable cost and at the present moment it is the most valuable commodity. Anyone who wastes water wastes the very essential article with the help of which more food can be produced. Holders of land who are fortunately placed near the channel headworks or higher up the irrigation channels, should remember the requirements of those at the tail-end who have also to contribute their utmost to produce more paddy in the country. Experiments conducted for years have clearly shown that an off-period of 3 to 4 days, off and on in irrigating paddy does not reduce either the yield of grain or straw as compared with continuous supply which involves waste of water. This is a very important point to remember in the economic utilisation of the available sources of water to produce more paddy. Broadly speaking, anyone, who grows more paddy or helps others to grow more paddy, is a benefactor to his fellow-citizens, and renders a service to his country.

Another recommendation to increase the production of paddy and also economic utilisation of water is the raising of early maturing varieties. *Bangarakaddi*—S. 705, matures in three months from the date of transplantation as against *Coimbatore Sanna* which matures in five months from the

date of transplantation. The rice from *Bangarakaddi* is quite as fine as from *Coimbatore Sanna*. In fact, it is very difficult to distinguish between the two varieties of rice when placed side by side. Experiments in the Nagenahalli Paddy Breeding Station have shown that the difference in yield between the two varieties is not appreciable. This is a particularly important matter in connection with tanks where by economic utilisation of water two crops—*Karthika* and *Vaisaki*—can be raised by the adoption of three months' variety of paddy—*Bangarakaddi*—instead of the long duration paddies. This is one of the best paddies to be adopted where two crops are desired. There is little justification for utilising all the water in the tank for a five months' duration paddy instead of raising two crops with a three months' variety which gives almost the same result per crop in respect of yield of grain and straw.

Another variety of paddy recommended for the same purpose is *Halubbalu*—S. 317. It is a crop of $3\frac{1}{2}$ months' duration from the date of transplanting. It gives very good yield and is suited to both the seasons. The recommendation of the Department is that under tanks where by economic utilisation the supply of water can be prolonged to grow two crops, every attempt should be made to grow two crops. The case under river channels is different because the water supply is available only for one season of seven months, and there is no harm in growing long duration varieties as two crops are not practicable.

To summarise the methods of improving paddy production to meet the present emergency are—

(1) Grow improved types which yield more than the local.

(2) Apply manure to increase the yield.

(3) Utilise water economically to enable your neighbour also to grow paddy.

(4) Under tanks grow early maturing varieties like *Bangarakaddi* or *Halubbalu* so as to raise two crops where ordinarily only one long duration crop is now grown.

Togari.—The next important article of food which has any great deficit in Mysore is *togari*. The annual import of *togari* in Mysore State from Central and North India is about three lakhs of railway maunds, worth about 15 lakhs of rupees. Though *togari* is not imported across the sea, the question of transport difficulties due to the present conditions is likely to create difficulties in securing the quantities needed for consumption in the State. Every one knows that *togari* is a very good crop to grow as an *akkadi* to ragi. It grows as a dry crop where ragi or jola can grow. The total area under ragi and jola in Mysore State is nearly $2\frac{1}{2}$ million acres and yet it is a great pity that Mysore does not produce enough *togari*. The recommendation of the

Department is that every ragi grower should grow *togari* as an *akkadi* crop, that is, in rows 4 feet apart. Growing of *akkadi* crop is a common practice in Mysore. All kinds of miscellaneous crops such as, fodder—*jola*, niger and others, are grown as *akkadi*, except in Kolar District where *avare* is grown as the *akkadi* crop. *Togari* could be grown even on black cotton soils as an *akkadi* with cotton. It can be grown with even crops like *castor* or *jola*. It is essential now to increase the production of *togari* in the State to meet the annual deficit.

Raiyats who wish to have any help in growing more paddy and who are not able to get that help locally form the local subordinate officials of the Department are welcome to write to the Head Office, to secure the necessary help.

Results of Demonstration Plots—Use of Improved Seeds

Sl. No.	Taluk	Village	Name of grower	Strain number	Grain yield per acre in seers	Grain yield per acre in seers of local paddy
1	Kumsi ..	Ayanur	Nagappa	S. 684	3,200	2,000
2	Tumkur ..	Heggere	Gopal Krishnaiah	S 684	2,560	1,600
3	do ..	Thumbadi	B. S. Krishnamurthi	S. 547	3,840	3,040
4	do ..	do	do	S. 317	3,040	2,000
5	Madhugiri ..	Siddanahalli	V. Subba Rao	S. 547	3,600	2,520
6	do ..	do	do	S. 317	2,520	..
7	do ..	Hosakere	Bommanna	S. 547	3,333	2,283
8	do ..	Byalya	Gurappa	S. 547	3,200	2,800
9	do ..	do	do	S. 317	2,800	..
10	do ..	Doddandur	Bhakthar Saheb	S. 547	2,680	2,200
11	do ..	Dodderi	Thimmiah	S. 547	4,130	3,000
12	do ..	do	do	S. 317	3,000	..
13	do ..	Chinakavajra	Venkategowda	S. 547	3,428	..
14	Tumkur ..	Kambadahalli	Prabhakariah	S. 547	3,200	2,000
15	do ..	Tumkur	T. D. Venkataramiah	S. 705	2,520	..
16	Bowringpet ..	Ganjarapalli	Karapatti Rangiah Setty	S. 683	2,514	..
17	do ..	do	Nagegowda	S. 683	3,500	..
18	Sira ..	Bukkapatna	C. Muddappa	S. 705	3,325	2,400
19	Madhugiri ..	Bommanahalli	Venkateshappa	S. 705	2,746	1,666
20	do ..	Hosadurga	Bheemasena Rao	S. 705	3,733	2 333
21	do ..	Chikkanahalli	Bhargawan	S. 705	2,566	..
22	Turuvekere ..	Turuvekere	D. Krishnappa	S. 705	2,720	2,520
23	Bangalore ..	Kaikondahalli	Gundappareddi	S 705	3,600	..
24	do ..	do	Narayanareddi	S. 705	3,200	..
25	Hoskote ..	Hoskote	Appajappa	S. 317	2,528	2,400
26	Koratagere ..	Koratagere	Hariharagowda	S. 705	2,670	2,200
27	Kunigal ..	Shanbhoganahalli	Kallandarsab	S. 705	2,600	1,940

Results of Demonstration Plots (Paddy Manurial Trials)

Sl. No.	Taluk	Village	Name of grower	Grain yield per acre in seers manured	Grain yield per acre in seers unmanured
1	Anekal ..	Muthanallur	Muniswamireddi	2,880	2,400
2	Holenarsipur ..	Mallasamudra	S. Narasimhachar	2,900	2,600
3	French Rocks ..	Devegowdana Koppal	Kethumarigowda	2,600	2,284
4	Krishnarajpet ..	Palagrahara	Muddegowda	2,800	2,200
5	Chikballapur ..	Bommanahalli	Thananarayana Setty	2,592	2,348
6	Chintamani ..	Thalagawara	Venkatarayappa	2,560	2,040
7	do ..	Bikandhalli	B. S. Krishna Rao	2,954	2,700
8	do ..	Mindagallu	Rangachar	2,592	1,181
9	do ..	Gowripalli	G. Ramappa	3,200	1,920
10	do ..	Kasettipalli	Venkataramareddi	2,784	1,200
11	Tumkur ..	Huchuveeranapalya	Honnappa	3,600	2,400
12	Koratagere ..	Koratagere	Narasinga Rao	2,800	2,000
13	do ..	do	Hanumantha Rao	3,600	1,800
14	do ..	do	C. Ramaiah	3,200	2,200
15	Madhugiri ..	Gujjanadu	Venkatesiah	3,200	2,400
16	Sira ..	Chiknahalli	Patel Ramagowda	2,566	1,948
17	do ..	Bukkapatna	C. Muddappa	3,200	2,400
18	Krishnarajpet ..	Madahalli	Kalegowda	2,512	2,182
19	Srinivaspur ..	Armakalhalli	Y. N. Vasudeva Rao	2,600	1,800
20	Hosakote ..	Hosakote	Appajappa	2,800	1,400
21	Koratagere ..	Koratagere	Hariharappa	2,900	2,100
22	Krishnarajpet ..	Gaddehosur	Kalegowda	2,512	2,182
23	do ..	Muddanahalli	Shanbhogh Thammiah	2,624	2,016

Improvement of *Doddahatti* Cottons in Mysore*

By

G. Sreenivasa Iyengar

The introduction of American Cottons or the *Doddahatti* Cottons in India, particularly in Mysore, dates as early as 1840, when the first trials were made near Kadur under rainfed conditions. Though this type of cotton was grown with advantage and made a gradual spread in the several parts of the State, there has been a serious drawback, in that it develops a kind of leaf-disease known as " Red Leaf " disease which results in the early shedding of leaves and incidentally reduces the yield. Attempts to introduce the other types of American and other exotic cottons, under rainfed conditions, proved a failure on account of their susceptibility to this leaf-disease. Selections in the acclamatised Dharwar-American (*Doddahatti*) has not given any encouraging results. It is claimed that *Gadag No. 1* developed from Dharwar-American Cotton by the late *Rao Sahib* Kottur, is fairly resistant to the leaf-disease but this variety in our experience is affected very badly.

The origin of several varieties of Egyptian Cottons is traced to *Gossypium purpurascens* which does not get this disease. Further some of the types have a long staple and high ginning. The idea of combining the economic characters and the important disease resistance of *Gossypium purpurascens* (Tree cotton) was first conceived by the late V. N. Ranganatha Rao, L.Ag., Economic Botanist of the Department of Agriculture, Mysore State, as early as 1919. With this object in view, a cross was effected between the local *Doddahatti* (Dharwar-American) and a tree cotton which answered to *Gossypium purpurascens*. The study of several generations resulted in fixing up of four homozygous strains, the four Mysore American Cottons—M.A. I, M.A. II, M.A. III, M.A. IV, of which M.A. II —has come up to the ideal with which the cross was effected. Thus it was possible to evolve a strain, which suits well for our tracts.

Apart from evolving a strain, fairly resistant to the leaf-disease there are several methods by which the disease could be controlled to a great extent. Experiments conducted in the Department, during recent years, have definitely proved that the effect of different doses of nitorgen on the incidence of the disease is significant and that increased dose of nitrogen applied during different periods of growth produced a maximum number of healthy plants and incidentally a higher

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* Paper contributed for discussions at the last Annual Meeting of the Mysore Agricultural and Experimental Union, 1941.

yield. Basing on the yields, it is found that 50 lbs. of nitrogen applied in four equal doses is remunerative.

Further experiments conducted with the object of finding a method of selection of seeds, indicate that cotton seeds which sink when soaked in water give a better germination than the floating seeds and that there are varietal differences in the rate of sinking. The sunken seeds result in good, vigorous, and healthy plants and the incidence of the leaf-disease on these plants is much less than in those raised from the floating or dry seeds.

It is also of interest to note that under irrigation, the hand dibbling of seeds on the sides of the furrows gives better germination than either drill-sowing or dibbling in furrows.

As stated above, of the Mysore-American strains, M.A. II has given the best results. This improved hybrid strain is early maturing. It resists red leaf-disease to a greater degree than the other varieties. The plant is tall and erect growing with very few vegetative branches which bend and droop in later stages on account of the heavy bearing of fruits. The fruiting branches are long and short noded. The leaves are medium in size and light green in colour. The bolls are medium in size. The seeds are greenish fuzzy. This strain has a staple of $\frac{3}{4}''$ to $\frac{7}{8}''$ and a ginning of 31%. The yield is very high, as much as over 1,000 lbs. of *kapas* under irrigation and 500 to 700 lbs. of *kapas* under rainfed conditions.

This variety owing to its earliness, greater reistance to red leaf disease and high productivity has gained popularity in Banavar area under rainfed conditions. It is now also assured that this variety could be grown with success in the Irwin Canal area during summer sowings. Studies so far made on M.A. II both under favourable and adverse ecological and climatic conditions and at different sowing dates, go to show that this strain withstands the attack of red leaf disease to a greater degree than the others, and excels other varieties in its productivity. It is inferred that these two important qualities might have been transferred from the *purpurascens* parent. To improve the lint percentage, lint length and further resistance to red leaf disease plant selections have been effected.

In addition to the improvement from plant selection it was thought desirable to back cross this strain with *Gossypium purpurascens*. With this end in view, a very systematic and intensive survey of the available types of tree cottons answering to the type of *G. purpurascens* was made in several parts of the State a few years back. It is interesting to note that several types, pure to certain characters, were available which gave a staple length varying from 1″ to 1 2/5″ and a ginning of 29 to 42%. Of these, type No. 10 with a staple of $1\frac{1}{4}''$ and a ginning out-turn of 38·7% was selected as one of the parents.

In the first instance back crossing of M.A. II and crossing of Co. 2 with type No. 10, was taken up. The fourth progeny of these crosses are under study. Some of the selections are very promising giving a staple length of 1 3/16" and a ginning of 37%.

The idea of evolving a long staple cotton for the irrigated tracts of the Irwin Canal area was taken up as late as 1935, when a scheme for combating red leaf disease was financed by the Indian Central Cotton Committee.

Intensive study regarding the extent of the disease in some of the then existing strains, wa· undertaken. It was found that among the *hirsutums* M.A. II has a greater resistance to the disease than any others. The later introduced varieties like Co. 4 and Co. 3, though getting the disease late are not as resistant as M.A. II. These varieties along with Co. 2 and Co. 1267 give good yields. Of these, M.A. II and Co. 4 are the best. Study of the Punjab-American Cottons and American Cottons disclosed that they suffer considerably from the disease and are poor yielders. Selection work amongst these has resulted in fairly uniform and better types than the bulk, but in point of disease there has been no decided improvement.

Experiments were started at Irwin Canal Farm to ascertain which of the long and medium stapled American Cottons under study would be suitable for this tract under the existing seasonal and environmental conditions. Twelve varieties were selected and tried during twelve seasons in replicated randomised lay-outs with fresh randomisation for each sowing. These experiments have disclosed that March sowing gives the best result and that the incidence of the disease is least during this period. It is also learnt that the incidence of the disease is more during September to December and much less during February to August. Though M.A. II and Co. 4 have given almost the same yield of *kapas* during all the seasons the lint obtained per acre is much less in case of M.A. II. Further the length of staple and the standard warp counts to which Co. 4 could be spun is higher than that of M.A. II. Owing to the superiority of Co. 4 it was decided to distribute the seeds in the Irwin Canal tract until the new strain evolved by the Department (to be discussed later) is finally tested or until the new introduction of the Egyptian Cottons now under trial prove a success.

With the failure of early attempts to introduce the imported varieties of the African and American Cottons and the general experience gained about all imported types being susceptible to red leaf disease, it was decided to improve the local strains—M.A. II and Co. 2 by hybridization with the exotic cottons. As aforesaid M.A. II and Co. 2 resist the disease to a good extent but from the point of boll size and ginning percentage Co. 2 gains over M.A. II. Hence a series of crosses between Co. 2 and M.A. II with Sea Islands, Egyptians and exotic and acclamatised *hirsutums* of quality but susceptible to the red leaf disease were made in the year 1935–36. Sufficient information has been obtained and observations recorded on the

various forms existing in these several classes of the hybrids. Study of hereditary characters and the reactions of the selections to the disease, pests and environmental conditions have been carried out. The other characteristics to which special attention has been given are the improvement of yield of *kapas* per acre and the maintenance of definite standards of staple and ginning percentage. However, the work has progressed so far that it has been found possible to combine a high yield with staple of 1″ to 1 $\frac{3}{16}$″ and ginning out-turn of 34 to 36 per cent. The following four hybrids have now been established and have already been tested for yield statistically, for three seasons. The seeds are being multiplied.

M.A. V, Co. 2 × *Uganda.*—The plant resists the red leaf disease well and remains in a green condition and holds its leaves to the end. The vegetative branches are rather very few but bend and droop in later stages on account of the heavy bearing of the big sized bolls. Fruiting branches are fairly long. The leaves are fairly large in size, dark green in colour and broad. The bursting of the bolls is good and thus affords facilities for clean and easy picking. The seeds are large and whitish fuzzy. The staple length is 1 $\frac{3}{16}$″ with a ginning percentage of 35–36. It has good yielding capacity.

M.A. VI, Uganda × *Co.* 2.—The plant is not as vigorous as the above but is slightly earlier. It is fairly resistant to the disease. The fruiting branches are short to medium in size. The bolls are fairly big and the boll bursting is fairly good. The seed is medium in size and whitish fuzzy. This strain has a staple of over 1″ to 1 1/16″ and gives a ginning percentage of 34. The lint is very soft. In point of yield this strain does not equal the above strains, Co. 4 or M.A. II.

M.A. VII, Co. 2 × 289 *F*/38.—This improved hybrid strain is early maturing. Resists the red leaf disease to a good extent. The plants are fairly vigorous with very little of vegetative branches. The fruiting branches are rather medium to long in size. The leaves are green in colour. The bolls are big in size. The seed is medium in size and with whitish-grey fuzz. The staple is just over 1″ with a ginning of 34%.

M.A. VIII, 289 *F*/38 × *Co.* 2.—The plants are similar to the reciprocal cross and equally early. Boll is more rounded than long, but the size is medium. The staple length is just over 1″ with a ginning of 34 per cent.

The lint sample of the above improved Mysore-Americans have been sent to the Technological Laboratory, Bombay, for fibre and spinning tests. The results are awaited.

Trial of the Egyptian and Sea Island Cottons on the Irwin Canal Farm

Till very recently attempts to introduce the quality cottons the Sea Islands and the Egyptians was confined to a few row tests, which did not

lead to any conclusive results. It was only during the early part of this year that the question of cultivating the exotic cottons, particularly the Egyptian and the superfine Sea Island Cottons was taken up at the suggestion of the Director of Agriculture, who was able to get a good stock of seeds of *Giza* 7, *Giza* 12, *Maraad*, *Sakel* and *Ashmouni* from Egypt. These varieties are under trial. Experiments are laid out to find out the spacing required for these under our conditions, and also to find out the best of the five varieties and the best season for the successful cultivation of these. In this connection it may be cited that as early as 1904, the Sind Department of Agriculture introduced some of the then important varieties of Egypt, but the introduction proved to be a failure on account of late water supply, the susceptibility of plants to boll worms, the long period of growth so as to be affected by frost and want of careful cultivation. But the later introductions (1927–28) of Sea Island and Egyptian long stapled cottons are promising. In the three promising varieties *Ashmouni*, *Zagora Malaky* and Sea Island, work of unit plant selection for high yield and resistance to leaf crinckle disease and adverse soil and weather conditions was made. Of these the two improved standards are *Sind B. III* and *Sind Sea Island*. Even these are grown over a small area. As some of the drawbacks experienced in Sind in the acclamatization of superior cottons are not to be met with here, there is every possibility of a good future for these cottons.

The first large-scale sowings of the Egyptian cottons in Mysore was made in June 1941. The plants made a very good growth with very little of vegetative branches. The bearing is rather enormous. As this season of sowing for cotton, according to the results of the seasonal trials, is not the best and as the local cottons which yield well in March, yield about 500 lbs. per acre when sown during June, the yield of 500 lbs. of *kapas* of *gizas* per acre harvested on the Irwin Canal Farm indicates that there is a good future for the Egyptians. In this connection, mention may be made that an yield of 1,200 lbs. per acre of *gizas* was obtained from June sowings at Babbur Farm near Hiriyur. In addition to the trials on the farm, seeds of the five types of Egyptians have been distributed in the several cotton growing centres for trial. This leads us on to know exactly the type of Mysore soils and climate in which the Egyptian Cottons could be grown.

In conclusion, I wish to express my gratitude to the President and Members of the Mysore Agricultural and Experimental Union, for giving me an opportunity to place before them a general survey of the attempts so far made to improve the American Cottons and the results so far achieved.

Practical Results of Sugarcane Research in Mysore

By

B. Venkoba Rao, B.Sc.

Sugarcane occupies a very important position amongst the money crops of the State. On account of this fact researches on the varied problems connected with this crop have been in progress practically from the inception of the Department. Fund of valuable information collected in earlier years from careful and consistent cultural experiments, manurial requirements of the crop and breeding of improved varieties and actually incorporating them into cultivators practice made it possible to extend the area under this crop within a short time to a considerable extent under the Krishnarajasagara Irrigation Project and also to establish and successfully work a Sugar Factory in the area since 1932. Sugarcane cultivation was practically unknown in this new tract and the ryots had to be guided from the start to the finish. This indeed gave the Demonstration Section of the Department a splendid opportunity to recommend to the ryots with confidence how to raise a good sugarcane crop by adopting improved methods of cultivation, the judicious ways of manuring and planting improved variety of cane best suited to the locality. The ryots, in turn, soon began to appreciate the value of these recommendations and became adepts in growing sugarcane. To mention a few, the wooden ploughs gave place to improved steel ploughs. Selection of good seed setts and initial soaking in water for a few hours to ensure uniform germination and stand became a common practice. Planting of cane in continuous rows 3 to 4 ft. apart was uniformly adopted as the preliminary experiment conducted had indicated this method of planting to give the best yields and reduce the seed rate. To prevent lodging of cane, planting in furrows a foot deep and gradually filling up the furrow was adopted. While, previously the value and use of artificial manure were unknown it became a universal practice to apply, in addition to the cattle manure procurable by the individual ryot in the village, a dose of nitrogen in the form of 5 to 7 cwts. of ammonium sulphate and phosphoric acid in the form of superphosphate to the extent of 1 cwt. per acre. The little difficulty that was experienced in the application of the artificial manure as it showed a tendency of being blown off by the wind, was soon overcome by introducing the method practised in Java of applying measured quantities of fertilizer in small holes of uniform depth placed at regular intervals along the cane rows. H.M. 320, a seedling cane evolved in Mysore, was chosen for the general distribution as the performance of this variety in a number of trials conducted in previous trials had proved to be the best. This variety possesses exceptionally good economic characters and yields on an average 40 to 50 tons

in heavy soils under proper cultivation. The chemical analysis of the juice of the fully matured H.M. 320 has indicated that the juice contains 21% sucrose and 0·2% glucose with a purity of 92. Since the keeping quality of the cane after attaining maturity was also remarkable, this variety was particularly recommended by the Department.

So far some of the results that had accrued by the research work conducted in earlier years and which were put into cultivators' practice have been broadly outlined. As research in crop improvement has no finality and should always be of a continuous nature in order to keep pace with the growing need of the sugar industry, it became necessary for the Department to strengthen the staff engaged in sugarcane research. Since, the Mysore climate is pre-eminently suited for sugarcane breeding and the varieties evolved previously had proved a great success and built up a reputation, a comprehensive scheme was submitted to the Imperial Council of Agricultural Research with the object of extending breeding operations in order to make available the results obtained to other provinces in India and to explore newer methods in plant breeding. The Imperial Council of Agricultural Research was pleased to sanction the scheme for Breeding of Thick Canes in Mysore in the year 1933 for a period of five years in the first instance and after the expiry of the same it was further extended till 1942 with additional staff and more money in view of the usefulness of the scheme and the results achieved. One special feature of the scheme correlated with the breeding programme of evolving new seedling canes of economic value was to conduct statistical, varietal and manureal experiments also on them. Since sugarcane breeding work takes several years before results are available to the raiyats, the work started nearly eight years ago under the scheme, is giving results useful to the ryots only now. The practical results obtained and those that have been put into cultivators' practice have been summarised below.

Since the inception of the scheme a number of crosses have been successfully effected and several lakhs of hybridized seedlings have been raised. Over 40,000 seedlings have been actually studied and of these 500 selections of the promising ones, have been made after repeated study and elimination and these are in various stages of multiplication. H.M. 661, one of the 1933 batch of seedlings, having excelled all standard canes of Java and Coimbatore, under Mysore conditions is under fast scale multiplication in Factory Farms, Departmental Farms and in the ryot's field. The Mandya Sugar Factory Farm alone has been given seed setts for 10 acres for multiplication to 100 acres before the end of the current year. This variety, yields nearly $\frac{3}{4}$ ton of sugar more per acre as compared with other varieties. The chemical analysis of the juice of this variety at the 12th month, showed that it contained nearly 20% sucrose with a purity of 93·66. Since the variety arrows very sparsely when planted during the months of March, April and May, there is every likelihood of H.M. 661 replacing all other improved varieties

introduced earlier, within a very short time. The other outstanding varieties evolved under the scheme which are being popularised and worthy of mention are H.M. 647 and H.M. 645.

As a result of maturity studies conducted on the promising seedling canes of 1933 batch, the following varieties have shown promise as early ripeners, *viz.*, H.M. 649, H.M. 652, H.M. 654 and H.M. 656.

A series of extended trials both on the manurial requirements of sugarcane and the most economical combination of the different manures were made on the several Government Farms in the State and the following manurial programme has been evolved as a result of these trials. The programme has been generally adopted by sugarcane growers all over the State, as they are assured of a substanial increase of crop of high quality amounting in many cases to as much as 40 to 45 tons of sugarcane against a normal yield of 20 to 25 tons.

The programme is as follows :—

A crop of green manure is preferably grown on the land to be cropped later with cane and ploughed in when it is 2 months old and planting of cane taken up 2 weeks thereafter. In other cases, at least 4 cartloads of green manure are ploughed in, a fortnight before planting. 6 cartloads of compost or 20 cartloads of farmyard manure are applied one week thereafter. A mixture of one bag of sulphate of ammonia (2 cwts.) and half a bag of Conc. superphosphate or one bag of steamed bonemeal is applied in the furrows, a day before planting, covered with a thin layer of soil, irrigated gently and planted with setts in the usual manner.

When the crop is 6 weeks old, 1½ bags of sulphate of ammonia (3 hundred weights) or half a ton of groundnut oil-cake is applied and the crop earthed up lightly ; a further application of half a ton of groundnut oil-cake is made at 13 weeks from planting and the crop is earthed up finally.

It should be emphasised that application of fertilizers or manures should not be prolonged after the crop is 16 weeks old, as it is likely to delay ripening and prolong vegetative activity.

In Mysore, the sugarcane cultivator is exceptionally lucky in not having any serious cane disease to fight against, except it be for a slight damage caused by borer. In addition to the selection of borer-free cane setts for planting, trapping borer moths by trash bundles, removing dead-hearts, collection of borer egg-masses and release of egg-parasites, the ryots have responded remarkably in taking to the two simple methods of control recommended by the Entomologist of the Department, firstly, the removal of the first leaf-sheath of cane as these are observed to harbour large number of borer larvæ and destroying them, and secondly, to give a light earthing up with a mould board plough when the shoots are young, *i.e.*, a month old.

Consequent on the enormous development of the sugar industry year by year there has been greater demand for improved seeds of early, medium and late varieties of cane to prolong the crushing season. Every effort in the line is being made to evolve new varieties of cane to suit different soil and climatic conditions and at the same time bring profit both to the grower and to the consumer. Many promising varieties have already been selected and are at various stages of multiplication. Concurrent with the breeding work, a number of other problems connected with cane that would be beneficial to the factory owners and cultivators are also being tackled and the results watched with keen interest.

In conclusion it has to be said that the work of extension and popularisation of improvements ordinarily rests in the hands of Divisional Officers in charge of one or more districts, assisted by their staff of Agricultural Inspectors and Fieldmen. It is admitted that the transmission of the fruits of āgricultural research to the ryot's fields is a great problem in almost every place. An attempt has been made to solve this problem in Mysore recently by means of subvention farms for all important crops. Experience has taught that no single variety could suit all types of soil and climatic conditions and varieties are to be bred up to suit and satisfy respective local conditions. In order to fix up varieties to different cane growing areas subvention farms covering all the typical cane growing tracts of the State have been started in the current year. The promising seedling canes picked out after the preliminary statistical varietal trial have been under test on these subvention farms. Since these subvention farms are run by ryots themselves this gives an added advantage to the ryots to compare the relative merits of each variety as against the local one. The starting of these subvention farms is an important link in the chain leading from the research station to the ryots' fields. In Mysore, the acreage under the improved varieties of cane has been on the increase considerably year by year and with the additional facility afforded by sanctioning of subvention farms it leaves no doubt that the ryots of each locality would grow in future only such an improved variety of cane as would bring them more money returns for the same initial outlay.

The following are the promising sugarcane varieties evolved under the Imperial Council of Agricultural Research Scheme, which are being issued for trial to the ryots:—

H.M. 661.—A seedling cane obtained as a result of a cross between Co. 281 × Teosinte. Erect and very vigorous in habit. Tillers freely. Grows on an average from 10 to 12 feet having a medium stalk of light rose colour with long internodes. There is no bloom on the cane. Arrowing slightly late or absent. As compared with other standard canes this variety has given a high yield of over 40 tons per acre in the Irwin Canal Farm under statistical test. The milling is easy. Gives a percentage extraction of nearly 60. The juice contains over 20 per cent. Brix at 12th month with high

percentage of sucrose and purity. The high quality of the juice is maintained for a fairly long period without deterioration. Jaggery prepared from this variety is quite hard and of a good colour. Being drought resistant the performance of this variety has been equally good under the Babbur Farm conditions. This variety is full of promise and seems to be able to replace all other standard varieties.

H.M. 647.—This is a seedling cane raised from seeds of Co. 290 collected from open pollinated arrows possessing good many desirable qualities. Erect, very vigorous in habit and non-lodging. Tillers on an average from 8 to 9 per stool. Canes are medium to thick in size and the internodes are long. Arrowing is practically nil and grows to a pretty good height. This seems to resist drought to a considerable extent. This variety has given as high yield as 41·5 tons per acre under statistical tests on the Irwin Canal Farm. The yield of this variety under Babbur Farm conditions is equally high. The juice analysis showed this variety to contain higher percentage of Brix under Babbur Farm conditions. The Chemical analysis of the juice at 12th month on the Babbur Farm contained over 21 per cent. Brix. In spite of the higher percentage of fibre, gives an extraction of nearly 60 per cent. This variety is very well suited for jaggery making and promises to have a bright future specially in dry tracts.

H.M. 645.—This is a seedling cane raised from the seeds of Co. 281 collected from open pollinated arrows. Vigorous in habit. Tillers profusely. The canes are medium to thick in size with medium internodes. Whitish in colour turning light yellow when exposed. There is a slight tendency for arrowing. Yields over 27 tons per acre. Gives a very clear juice with a percentage extraction of over 54 per cent. The fibre content of this variety is very low. The juice contains over 20 per cent. brix at 12th month. This variety has proved to be very good for the preparation of white boora sugar of excellent quality. The jaggery prepared from this possessed an attractive golden yellow colour.

H.M. 659.—A seedling cane raised from Co. 313 from seeds collected from open pollinated arrows possessing very desirable agricultural characters. Tillers freely. The cane is medium to thick in size having medium internodes. There is a slight tendency for arrowing and the percentage of arrowing is very low. This variety has yielded over 36 tons per acre under statistical tests conducted on the Irwin Canal Farm. Easy for milling and gives an extraction percentage of nearly 63. The juice is very clear and possesses nearly 20 per cent. brix at 12th month. Jaggery of a high quality could be prepared from this variety.

H.M. 657.—This a seedling cane obtained from P.O.J. 2878 possessing good habit. Tillers profusely giving on an average 10 to 12 canes per stool. The cane is medium to thick in size. Internodes are fairly long. This variety

has given the highest yield of 45·5 tons per acre under statistical test conducted on the Irwin Canal Farm. The sucrose per cent. in the juice is slightly less than H.M. 661. This ripens between 12th to 13th month. Juice contains over 19 per cent. brix and continues to maintain the cane quality even though the canes are allowed to stand in the field for a few months without being harvested. Good quality jaggery could be prepared from this variety.

H.M. 653.—This is a seedling cane obtained from P.O.J. 2878 possessing good habit. Tillers on an average from 8 to 10 per stool. Medium greenish white cane with slight bloom. There is a tendency for arrowing but a heavy yielder. Under statistical test on the Irwin Canal Farm, has given over 40 tons per acre. The juice is rich in sugar and possesses over 20 per cent. brix at 12th month. Hard light brown jaggery could be prepared from this variety.

H.M. 658.—A seedling cane raised from seeds of P.O.J. 2878 collected from open pollinated arrows. Erect and very vigorous in habit. Tillers on an average from 7 to 8 per stool. The canes are medium to thick in size and the internodes being medium. A very heavy yielder. An yield of nearly 40 tons per acre has been obtained under statistical test. The percentage of extraction is as high as 63 and the juice contains over 19 per cent. brix at 12th month. The quality of juice is quite good for the manufacture of jaggery.

H.M. 656.—This is a seedling cane raised from seeds of P.O.J. 2878. Erect and very vigorous in habit. Tillers moderately giving on an average 8 to 9 canes per stool. The canes are from medium to thick in size with long internodes. There is a slight tendency for arrowing. The yield from this variety has however been as high as 37 tons per acre under statistical trials. The juice is rich possessing over 20 per cent. brix at 12th month. Good hard golden yellow coloured jaggery could be manufactured from this variety.

H.M. 654.—A seedling cane of P.O.J. 2878 erect and very vigorous in habit. Tillers moderately. The canes are medium to thick in size with long internodes and having slight bloom at the nodal region. Arrows late in the season and the percentage of arrowed canes being low. Has given a yield of even 36 tons per acre under statistical test on the Irwin Canal Farm. Gives an extraction percentage of over 63. The quality of juice is good, containing 20·5 per cent. brix at the 12th month. This variety is quite suited for preparation of good hard jaggery.

H.M. 651.—This is a seedling cane raised from the seeds collected from open pollinated arrows of P.O.J. 2878. Vigorous in habit. Tillers profusely. Cane greenish in colour, medium to thin in size with slight bloom spread throughout the length. Turning yellowish when exposed. There is a slight tendency for arrowing. Heavy yielder. An yield of over 39 tons has been obtained under statistical tests conducted on the Irwin Canal Farm. Seems to resist drought. The qulity of juice is quite rich containing nearly 21 per cent. brix at 12th month and makes a hard light coloured jaggery.

Results of Subvention Farms

As explained in the previous issues of the *Journal*, Subvention Farms take the results of the Government Central Farms a great deal nearer to the raiyat's practice. Figures from Paddy Subvention Farms laid out in Nanjangud, Krishnarajnagar and T.-Narsipur Ranges of the Mysore District are given below. In 15 out of 18 places one or more of the Selections have scored above the local check.

(1)

Paddy Subvention Farm at Immavu, Nanjangud Taluk, in the holding of Mr. Kaliah :—

1.	Nature of experiment ..	Varietal.
2.	Locality ..	Wet land.
3.	Nature of the soil ..	Loamy soil having small stones.
4.	Previous crop ..	Paddy (Green manure crop before sowing paddy).
5.	Preparatory cultivation	2 Ploughings before sowing green manure and 4 ploughings before transplanting.
6.	Irrigated or Dry ..	Irrigated.
7.	Common treatment, if any	30 Cartloads of cattle manure in addition to green manuring.
8.	Date of application ..	29—6—1941.
9.	Date of sowing in nursery	13—6—1941.
10.	Seed rate ..	25 seers per acre.
11.	Date of transplanting ..	20—7—1941.
12.	Planting distance ..	4 to 6 inches apart.
13.	Area of the plot ..	3 acres.
14.	Results—	

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 661	1990	4200
S. 699	1870	4020
S. 139	1500	4200
S. 67	1600	4300
S. 476	1690	4500
Check, Local G.E.B. 24 ..	1550	3320

(2)

Paddy Subvention Farm at Saragur, Nanjangud Taluk, in the holding of Mr. Ranga Setty:—

1. Nature of experiment .. Varietal.
2. Locality .. Wet land.
3. Nature of the soil .. Loamy soil.
4. Previous crop .. Paddy (Green manure crop before sowing paddy).
5. Preparatory cultivation 2 Ploughings before sowing green manure and 4 ploughings before transplanting.
6. Irrigated or Dry .. Irrigated.
7. Common treatment, if any 20 Cartloads of cattle manure, in addition to green manuring.
8. Date of application .. 1—7—1941.
9. Date of sowing in nursery 15—6—1941.
10. Seed rate .. 25 seers per acre.
11. Date of transplanting .. 18—7—1941.
12. Planting distance .. 4 to 6 inches apart.
13. Area of the plot .. 3 acres.
14. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 661	2550	5760
S. 699	1900	4000
S. 139	1250	4800
S. 67	1260	3500
S. 476	1500	4000
Check. Local G.E.B. 24 ..	1300	3400

(3)

Paddy Subvention Farm at Sattur, Nanjangud Taluk, in the holding of Mr. Lingappa:—

1. Nature of experiment .. Varietal.
2. Locality .. Wet land.
3. Nature of the soil .. Clayey soil.
4. Previous crop .. Paddy (Green manure crop before sowing paddy).
5. Preparatory cultivation 2 Ploughings before sowing green manure and 4 ploughings before transplanting.
6. Irrigated or Dry .. Irrigated.
7. Common treatment, if any .. 30 Cartloads of cattle manure in addition to green manuring.
8. Date of application .. 7—7—1941.

9. Date of sowing in nursery 15—6—1941.
10. Seed rate .. 25 seers per acre.
11. Date of transplanting .. 26—7—1941.
12. Planting distance .. 4 to 6 inches apart.
13. Area of the plot .. 3 acres.
14. Results—

Variety	Yield per acre Srs. grain	lbs. straw
S. 661 ..	.. 2180	3200
S. 699 ..	.. 1950	3200
S. 139 ..	.. 1700	4200
S. 476 ..	1970	4000
S. 67	.. 1600	3900
Check. Local G.E.B. 24	.. 1500	3500

(4)

Paddy Subvention Farm in Golur Village, Nanjangud Taluk, in the holding of Mr. Siddasetty:—

1. Nature of experiment .. Varietal.
2. Locality .. Wet land.
3. Nature of the soil .. Clay loam.
4. Previous crop .. Paddy (Green manure before sowing paddy).
5. Preparatory cultivation 2 Ploughings before sowing green manure and 4 ploughings before transplanting.
6. Irrigated or Dry .. Irrigated.
7. Common treatment .. 45 Cartloads of Municipal refuse in addition to green manure.
8. Date of application of common treatment 23—6—1941 to 30—6—1941.
9. Date of sowing in nursery 22—6—1941.
10. Seed rate .. 25 seers per acre.
11. Date of transplanting .. 22 and 23—7—1941.
12. Planting distance .. 4 to 6 inches apart.
13. Area of the plot .. 3 acres.
14. Results—

Variety	Yield per acre Srs. grain	lbs. straw
S. 699 ..	.. 1800	2300
S. 661 ..	.. 2100	3700
S. 67 ..	.. 1300	4000
S. 476 ..	.. 1400	4400
S. 139 ..	.. 1450	4800
Check. Local S. 701	.. 1520	2800

(5)

Paddy Subvention Farm in Hullahalli Village, in Nanjangud Taluk, in the holding of Mr. Giriyappa:—

1.	Nature of experiment ..	Varietal.
2.	Locality ..	Wet land.
3.	Nature of soil ..	Red loam.
4.	Previous crop ..	Paddy (Green manure before sowing of paddy).
5.	Preparatory cultivation	2 Ploughings before sowing green manure and 4 ploughings before transplanting.
6.	Irrigated or Dry ..	Irrigated.
7.	Common treatment, if any	35 Cartloads of cattle manure, in addition to green manuring.
8.	Date of application of common treatment	17—7—1941.
9.	Date of sowing in nursery	28—6—1941.
10.	Seed rate ..	25 seers per acre.
11.	Date of transplanting ..	7—8—1941.
12.	Planting distance ..	4 to 6 inches apart.
13.	Area of the plot ..	3 acres.
14.	Results—	

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 661 ..	.. 1170	3100
S. 699 ..	.. 1210	3700
S. 139 ..	.. 1072	4100
S. 67 ..	.. 1140	4000
S. 476 ..	.. 1310	3900
Check. Local x **194**	.. 1040	3200

(6)

Paddy Subvention Farm in Hulimavu Village, Nanjangud Taluk, in the holding of Mr. Basappa:—

1.	Nature of experiment ..	Varietal.
2.	Locality ..	Wet land.
3.	Nature of the soil ..	Clayey soil.
4.	Previous crop ..	Paddy (Green manure before sowing of paddy).
5.	Preparatory cultivation	2 Ploughings before sowing green manure and 4 ploughings before transplanting.
6.	Irrigated or Dry ..	Irrigated.

7.	Common treatment, if any	30 Cartloads of cattle manure in addition to green manuring.
8.	Date of sowing in nursery	30—6—1941.
9.	Date of transplanting ..	4—8—1941.
10.	Planting distance ..	4 to 6 inches.
11.	Seed rate ..	25 seers per acre.
12.	Date of application of common treatment	15—7—1941.
13.	Area of the plot ..	3 acres.

14. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 699 ..	.. 2100	4400
S. 661 ..	.. 1900	4000
S. 476 ..	.. 1900	4800
S. 139 ..	.. 1600	4200
S. 67 ..	.. 1900	4700
Check. Local G.E.B. 24 ..	1700	3200

(7)

Paddy Subvention Farm in Hosagrahara Village, K. R. Nagar Range, in the holding of Mr. Sadasiviah:—

1.	Nature of experiment ..	Varietal.
2.	Locality ..	*Nala* area.
3.	Nature of the soil ..	Red and black mixture, loamy.
4.	Previous crop ..	Paddy.
5.	Preparatory cultivation	4 Ploughings when rains received.
6.	Irrigated or Dry ..	Irrigated.
7.	Common treatment, if any	20 Cartloads of cattle manure before green manure.
8.	Date of application of common treatment	12—5—1941.
9.	Date of sowing in nursery	7—7—1941.
10.	Seed rate ..	20 seers per acre.
11.	Date of transplanting ..	8—8—1941.
12.	Planting distance ..	8 to 9 inches apart.
13.	Area of the plot ..	3 acres.

14. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 67 ..	.. 2000	6720
S. 139 ..	.. 1800	5600
S. 246 ..	.. 2200	4480
S. 661 ..	.. 1400	3360
S. 699 ..	.. 1200	3360
Check plot ..	.. 1200	3360

(8)

Paddy Subvention Farm in Kuppe Village, Krishnarajanagar Range, in the holding of Mr. Basalingappa :—

1. Nature of experiment .. Varietal.
2. Locality .. *Nala* area.
3. Nature of the soil .. Red loam.
4. Previous crop .. Paddy.
5. Preparatory cultivation 4 Ploughings when rains received (May 1941).
6. Irrigated or Dry .. Irrigated.
7. Common treatment, if any 20 Cartloads of cattle manure with green manure.
8. Date of application of common treatment 10—5—1941.
9. Date of sowing in nursery 29—6—1941.
10. Seed rate .. 20 seers per acre.
11. Date of transplanting .. 3—8—1941.
12. Planting distance .. 8 to 9 inches apart.
13. Area of the plot .. 3 acres.
14. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 67 ..	.. 1800	4480
S. 139 ..	.. 1800	4480
S. 246 ..	.. 2000	3920
S. 661 ..	.. 1800	3920
S. 699 ..	.. 2000	3920
Check ..	.. 1800	3920

(9)

Paddy Subvention Farm in Katnal Village (Cheeranahally), Krishnarajanagar Range, in the holding of Mr. N. Narayana Rao:—

1. Nature of experiment .. Varietal.
2. Locality .. *Nala* area.
3. Nature of the soil .. Gravelly Soil.
4. Previous crop .. Paddy.
5. Preparatory cultivation 4 Ploughings when rains received (May 1941).
6. Irrigated or Dry .. Irrigated.
7. Common treatment, if any 12 to 15 Cartloads of cattle manure before green manure.
8. Date of application of common treatment 10—5—1941.

9. Date of sowing in nursery 29—6—1941.
10. Seed rate .. 20 seers per acre.
11. Date of transplanting .. 1—8—1941.
12. Planting distance .. 8 to 9 inches apart.
13. Area of the plot .. 3 acres.
14. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 67 ..	.. 1600	5600
S. 139 ..	.. 1600	5600
S. 246 ..	.. 1800	4480
S. 661 ..	.. 1800	3360
S. 699 ..	.. 1800	4480
Check ..	.. 1800	3360

(10)

Paddy Subvention Farm in Hanasoge Village, Krishnarajanagar Range, in the holding of Mr. H. V. Narayana Rao:—

1. Nature of experiment .. Varietal.
2. Locality .. *Nala* area.
3. Nature of the soil .. Red loamy, with gravel.
4. Previous crop .. Paddy.
5. Preparatory cultivation 4 Ploughings, when rains received (May 1941).
6. Irrigated or Dry .. Irrigated.
7. Common treatment, if any 10 to 12 Cartloads of cattle manure before green manure.
8. Date of application of common treatment 10—5—1941.
9. Date of sowing in nursery 29—6—1941.
10. Seed rate .. 20 seers per acre.
11. Date of transplanting .. 27—7—1941.
12. Planting distance .. 8 to 9 inches apart.
13. Area of the plot .. 3 acres.
14. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 67 ..	.. 1600	5600
S. 139 ..	.. 2000	5600
S. 246 ..	.. 2000	5600
S. 661 ..	.. 1600	4480
S. 699 ..	.. 2000	5600
Check ..	.. 1600	4480

(11)

Paddy Subvention Farm at Sanyasipur, Krishnarajanagar Range, in the holding of Mr. K. Boraiya:—

1.	Nature of experiment ..	Varietal.
2.	Locality ..	*Nala* area.
3.	Nature of the soil ..	Red loamy.
4.	Previous crop ..	Paddy.
5.	Preparatory cultivation	4 Ploughings, when rains received (May 1941).
6.	Irrigated or Dry ..	Irrigated.
7.	Common treatment, if any	10 to 12 Cartloads of cattle manure per acre, before green manure.
8.	Date of application of common treatment ..	3—5—1941.
9.	Date of sowing in nursery	19—6—1941.
10.	Seed rate ..	20 seers per acre.
11.	Date of transplanting ..	22—7—1941.
12.	Planting distance ..	6 to 8 inches apart.
13.	Area of the plot ..	3 acres.
14.	Results—	

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 67 ..	.. 2000	3360
S. 139 ..	.. 2400	4480
S. 246 ..	.. 2600	3360
S. 661 ..	.. 2400	3920
S. 699 ..	.. 2000	4480
Check ..	.. 2000	3920

(12)

Paddy Subvention Farm in Bommanahalli Village (Chikkavaddaravadi), Krishnarajanagar Range, in the holding of Mr. H. B. Boregowda:—

1.	Nature of experiment ..	Varietal.
2.	Locality ..	*Nala* area.
3.	Nature of the soil ..	Black gravelly.
4.	Previous crop ..	Paddy.
5.	Preparatory cultivation	4 Ploughings when rains received (May 1941).
6.	Irrigated or Dry ..	Irrigated.
7.	Common treatment, if any	10 Cartloads of cattle manure per acre, before green manure.
8.	Date of application of common treatment	6—5—1941.

9. Date of sowing in nursrey .. 29—6—1941.
10. Seed rate .. 20 seers per acre.
11. Date of transplanting .. 30—7—1941.
12. Planting distance .. 8 to 9 inches apart.
13. Area of the plot .. 3 acres.
14. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 67 ..	.. 1400	4480
S. 139 ..	.. 1600	4480
S. 246 ..	.. 2400	3920
S. 661 ..	.. 1600	3920
S. 699 ..	.. 1400	4480
Check ..	.. 1600	3920

(13)

Paddy Subvention Farm in Kethupura Village, T.-Narsipur Taluk, in the holding of Mr. Rangaswami Iyengar:—

1. Nature of experiment .. Varietal.
2. Locality .. Paddy area.
3. Nature of the soil .. Red loam mixed with sand.
4. Previous crop .. Paddy.
5. Preparatory cultivation 4 Ploughings with green manure.
6. Irrigated or Dry .. Irrigated.
7. Date of sowing in nursery 25–6–1941.
8. Seed rate .. 25 seers per acre.
9. Date of transplanting .. 5-8–1941.
10. Planting distance .. 4 to 6 inches apart.
11. Area of the plot .. 2·5 acres.
12. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 246 ..	.. 1950	4500
S. 684 ..	.. 1458	3260
S. 699 ..	.. 1270	2750
S. 701 ..	.. 1238	3000
× 194 ..	.. 1240	2770

(14)

Paddy Subvention Farm at Bannur, T.-Narsipur Taluk, in the holding of Mr. Allimiyan Sahib:—

1. Nature of experiment .. Varietal.
2. Locality .. Paddy area.

3. Nature of the soil .. Clay mixed with sand.
4. Previous crop .. Paddy.
5. Preparatory Cultivation 4 Ploughings, with green manure.
6. Irrigated or Dry .. Irrigated.
7. Date of sowing in nursery 12–6–1941.
8. Seed rate .. 25 seers per acre.
9. Date of transplanting .. 12–7–1941.
10. Planting distance .. 4 to 6 inches apart.
11. Area of the plot .. 3 acres.
12. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 246 ..	.. 1750	3940
S. 684 ..	.. 1330	2920
S. 701 ..	.. 1804	3370
S. 699 ..	.. 1510	3172
× **194** ..	.. 1680	3280
Local ..	.. 1756	3380

(15)

Paddy Subvention Farm in Kaggalipura, T.-Narsipur Taluk, in the holding of Mr. Madegowda:—

1. Nature of experiment .. Varietal
2. Locality .. Paddy area.
3. Nature of the Soil .. Red loam.
4. Previous crop .. Paddy.
5. Preparatory cultivation 4 Ploughings, with green manure.
6. Irrigated or Dry .. Irrigated.
7. Date of sowing in nursery 12–6–1941.
8. Seed rate .. 25 seers per acre.
9. Date of transplanting .. 22–7–1941.
10. Planting distance .. 4 to 6 inches apart.
11. Area of the plot .. 3 acres.
12. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 246 ..	.. 1950	4360
S. 701 ..	.. 1420	3320
S. 699 ..	.. 1230	2830
S. 684 ..	.. 1300	3270
× **194** ..	.. 1120	2776
Check, local ..	.. 1570	3690

(16)

Paddy Subvention Farm at Kodagalli, T.-Narsipur Taluk, in the holding of Mr. Javare Gowda :—

1. Nature of experiment .. Varietal
2. Locality .. Paddy area.
3. Nature of the soil .. Clay soil.
4. Previous crop .. Paddy.
5. Preparatory cultivation 4 Ploughings, with green manure crop.
6. Irrigated or Dry .. Irrigated.
7. Date of sowing in nursery 20–6–1941.
8. Seed rate .. 25 seers per acre.
9. Date of transplanting .. 30–7–1941.
10. Planting distance .. 4 to 6 inches apart.
11. Area of the plot .. 3 acres.
12. Results—

Variety	Yield per acre Srs. grain	lbs. straw
S. 246 ..	.. 1140	3920
S. 701 ..	.. 1130	2950
S. 684 ..	.. 1064	2900
S. 699 ..	.. 1030	2770
× **194** ..	.. 1100	2840
Check, local ..	.. 1000	3350

(17)

Paddy Subvention Farm in Muttati Village, T.-Narsipur Taluk, in the holding of Mr. Subba Rao :—

1. Nature of experiment .. Varietal.
2. Locality .. Paddy area.
3. Nature of the soil .. Sandy loam.
4. Previous crop .. Paddy.
5. Preparatory cultivation 4 Ploughings, with green manure crop.
6. Irrigated or Dry .. Irrigated.
7. Date of sowing in nursery 14–6–1941.
8. Seed rate .. 25 seers per acre.
9. Date of transplanting .. 2–8–1941.
10. Planting distance .. 4 to 6 inches apart.
11. Area of the plot .. 3 acres.
12. Results—

Variety	Yield per acre Srs. grain	lbs. straw
S. 246 ..	.. 1274	2990
× **194** ..	.. 1090	2600
S. 699 ..	.. 1156	2660
S. 701 ..	.. 1180	2700
S. 684 ..	.. 1354	3400
Check, local ..	.. 1406	3570

(18)

Paddy Subvention Farm at Sosale, T.-Narsipur Taluk, in the holding of Mr. Madasetty:—

1. Nature of Experiment .. Varietal.
2. Locality .. Paddy area.
3. Nature of the soil .. Red loam mixed with laterite.
4. Previous crop .. Paddy.
5. Preparatory cultivation 4 Ploughings, with green manure crop.
6. Irrigated or Dry .. Irrigated.
7. Date of sowing in nursery 24–6–1941.
8. Seed rate .. 25 seers per acre.
9. Date of transplanting .. 31–7–1941.
10. Planting distance .. 4 to 6 inches apart.
11. Area of the plot .. 3 acres.
12. Results—

Variety	Yield per acre	
	Srs. grain	lbs. straw
S. 246 × 194	1000	2736
S. 701	900	2572
S. 684	880	2420
S. 699	650	2132
Check, local	630	2170
	1000	2640

SELECTIONS, ABSTRACTS AND EXTRACTS

I

Crop Insurance

The Federal Crop Insurance Corporation in the United States of America was created for the purpose of furnishing the wheat growers of the Nation, a form of protection that is offered by no other agency, Governmental or Private. It commenced its programme as an agency of the Department of Agriculture, beginning with the 1939 wheat crop. Wheat was selected as the first crop being the primary crop of the country and a crop for which necessary yield and loss data for a large number of individual farms were readily available. An insured farmer is protected against loss due to drought, flood, hail, wind, winter-kill, tornado, insect infestation, plant disease, and other unavoidable hazards but not against losses due to poor farming practices, negligence, malfeasance, or from causes which he is in a position to prevent. All transactions and calculations are in terms of bushels of wheat and not in cash. Premiums are based on actual or appraised crop loss experience for a representative period of years for each individual farm insured. Indemnities are paid to the insured grower from the Wheat Reserve, built up by the Corporation through the collection of premiums, when the total production of an insured farm is less than the total insured production for that farm. For example, if insurance is written on 100 acres for a farm on which the average yield was 12 bushels, the amount of insured production under the 75 per cent. insured plan will be 900 bushels. If the total production on the farm is only 600 bushels, the insured grower will be paid 300 bushels of wheat. A summary of relationship between Premium Collections, Indemnities and Insurance Reserves, for the Crop years 1939–41 are indicated by the following figures :—

Crop year	Premium Collections	Indemnities Paid and Accrued	Insurance Reserve
	In Bushels of Wheat		
1939 ..	66,70,129	1,01,63,489	−34,93,360
1940 ..	1,38,00,812	2,28,95,629	−90,94,817
1941 ..	1,42,64,012	32,69,911	+1,09,94,101
TOTAL ..	3,47,34,953	3,63,29,029	−15,94,076

Details of working are being modified with the requirements of the season. The Corporation was prepared for extension of its programme to Cotton, beginning with 1942 crop. The work of County Acturial Structure was based upon the study of about 70,000 sample farms in over 900 cotton growing countries. Instead of paying his premium in the actual commodity or the cash equivalent at the time of applying for insurance, the method used in the 1941 programme, the farmer insuring his wheat or cotton crop for 1942 will sign a Commodity-Note, when

he signs application for insurance. The Note is part of the application and is payable in anyone of four different ways. The Note-plan is expected to save the Crop Insurance Corporation, about a million dollars in storage.

Yield data are being gathered with a view to extend the Insurance scheme to Corn, Citrus, Fruits, Tobacco and Rice.

—*Annual Report of the Manager of the Federal Crop Insurance Corporation*, 1941, U.S.D.A.

II

Utilisation of Press-Mud, Cane-Trash and Bagasse in the Cane Fields : 1.—Composting

Enormous quantities of cane-trash, filter-press cake, molasses and bagasse, have become available in consequence of the development of Sugar Industry in India. Their disposal is a problem. Much work has been done on the utilisation of molasses. The other substances also require attention. Filter-press cake is a valuable manurial material by itself, containing Potash, Calcium, Phosphate, Nitrogen and organic matter. It may be used either by itself or in admixture, with other waste materials and has come in handy for composting also. Composting experiments were conducted using filter-press cake (Sulphitation), and cane trash with cowdung and molasses for activators. Heaps that were turned at different intervals composted in 4 to 6 months. Two sets of experiments in which no turning was done, indicated that composting was completed in 12 months. These methods are advocated for factories, where labour counts more than time. In one such method, press-mud (4 cwt.) and bagasse (4 cwt.) were laid out in alternate layers about 2–3 inches in thickness each and the heap was made up of three such layers. Each of the layers was well mixed with a slurry of cowdung and molasses, before the next upper layer was placed on it. The layers were not mixed and no turning was given. In another trial press-mud (4 cwt.) and bragasse (4 cwt.) were well mixed with a thin slurry of cowding and molasses and a heap of suitable dimension was prepared ; and no turning was given.

—*The Indian Journal of Agricultural Science*, Vol. 12, Part 1, February 1942, R. C. Srivastava, H. S. Chaturvedi and K. Aswathanarayana Rao, pp. 158–63.

III

The Value of Molasses when Making Silage

While it is doubtful whether the addition of molasses to materials used for silage making is necessary or economical where crops such as maize are grown under good conditions, in good soil, and converted into silage at the correct stage, in accordance with approved methods, this treatment results in a more suitable product of higher feeding value, when silage is made under less favourable conditions.

As a general guide it may be stated, the quantity of molasses used depends upon the nature of the crop, the protein-content, and its succulence. Richness

in protein, coupled with low carbohydrate content, requires a greater quantity of molasses than where the reverse is the case. Roughly the range of the quantity of molasses to be added is from 20 to 50 lbs. to every ton of material being treated.

The molasses should be diluted with water to suitable consistency ; approximately 20 lbs. of molasses added to 10 gallons of water will be found to give a suitable solution. The solution is sprayed on to the material in the pit, or in the *silo*, as the case may be. A watering-can with fine rose, will be found quite suitable for the purpose. A practice adopted by some farmers is to feed the molasses solution into the feed-box of the silage-cutter at a point of entry close the knives, the discharge of the solution being controlled, so that the requisite amount of solution is added.

—*The Agricultural Gazette of New South Wales*, February 1, 1942, pp. 84–85.

IV

Drying Apples

All mid-season and late apples may be used for drying. The greatest quantity of Australian dried apples is produced in Tasmania.

The fruit is peeled, cored and sliced into rings by machinery. It is then exposed to sulphur fumes for about 30 minutes, using sulphur at the rate of 1 lb. to 200 cubic feet of space and then dried in an evaporator. In the factory, sulphuring is going on continuously and there is very little time between the time the fruit is cut and when it enters the sulphur chamber.

In doing small lots, there may be too long a wait before sufficient fruit is cut to sulphur ; in that case the cut fruit should be placed in a very weak solution of salt and water, just sufficient salt to enable it to be tasted. The fruit should not be left in the salt solution more than 15 to 20 minutes ; this dip will prevent the fruit turning brown before it is sulphured.

In Tasmania, kiln evaporators are chiefly used, the fruit being placed, direct on slatted floors above a hot air-chamber. The fruit is spread on the trays to a depth of about 2 inches. In hot dry climates, limited quantities of apples can be dried in the sun on trays. If the sun is very hot, the trays should be staked in such a manner that the air will pass readily through the trays over the fruit, as if exposed direct to the sun, the fruit will dry a dark colour. The preparation of apples for sun-drying is similar to that for kiln or evaporation drying. Sun-drying of fruits should only be attempted in dry-climates. In many cooler apple districts, the climatic conditions are not suitable for sun-drying, for, when the mid-season and late apples have reached a suitable condition for drying, there is not sufficient heat.

—*The Agricultural Gazette of New South Wales*, February 1, 1942, page 90.

V

Anti-larval Flushing of Rivers and Streams in Ceylon*

In order to be in a position to supplement the measures already being carried out in Ceylon to reduce the breeding of *Anopheles culicifacies*, Giles, in the beds of rivers and streams (*cf. R.A.E.*, B 25, 168), observations and experiments are being undertaken on the construction and operation of siphon dams for automatic flushing. Two types are described, the second being a modification of the first. Both are made of concrete in standardised units, so that the number used may be varied according to the width of the stream, and are strong enough to withstand damage by floating logs during times of flood. They are made on the spot and are designed to form part of the dam and so to avoid additional construction in the dam wall.

Observations were made on the physical effects of flushing in terms of height and width of the flush at various distances from the siphon and the velocity of the current before and during flushing. The probable effects on the larvæ were indicated by means of confetti scattered along the margins of rivers and pools at measured distances both upstream and downstream from the siphons. The results suggested that over a distance of 4,900 feet downstream more than 90 per cent. were destroyed ; this figure showed very slight variations on all sections. The flush was considered effective in preventing excessive breeding for distances of between $\frac{1}{2}$ and $\frac{3}{4}$ mile. Where the streams broadened out above the dam, the percentage of the confetti stranded averaged 50, but in deep and narrow reservoirs less than 10. Although gradually drawn towards the siphon, the confetti was not drawn into it and remained floating in deep water ; living larvæ would undoubtedly have kept to the shallow water at the margins, and it is improbable that any appreciable number would pass a siphon under natural conditions. On the other hand, breeding upstream was reduced by the elimination of isolated pools over the extensive stretch forming the reservoir. Records of surface velocity made at the same time as regular dippings indicated that a velocity of from $1\frac{1}{2}$ to $1\frac{3}{4}$ ft. per second would suffice to reduce marginal breeding to a mininum in rivers with a bed formed mainly of rocks.

The Review of Applied Entomology, Vol. 29, Ser. B, Part 1, January 1941.

VI

An Investigation on the Use of Automatic Siphon Sluices on a Group of Tea Estates in Northern Bengal†

A brief account is given of trials undertaken in 1939 with a type of automatic siphon sluice designed for use on estates in Ceylon (*R.A.E.*, B 27, 207), with a view to eliminating the necessity for supervision of flushing by means of the hand-operated sluices or the recurring expenditure of oiling schemes that are at present employed for the control of *Anopheles minimus*, Theo. Rainfall in northern

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* *J. Malar. Inst. India*, 3, No. 1, pp. 81-92, 2 pls., 3 figs., 4 refs. Calcutta, 1940.

† *Ibid.*, 3, No. 1, pp. 93–97, 2 refs., 1940.

Bengal differs greatly in amount and distribution from that normally prevailing in Ceylon or Malaya ; the average amount is about twice as great, and instead of being distributed more or less evenly, as in Malaya, most of it falls during a period of the south-west monsoon (June–September). Since the discharge rate of Ceylon sipohn proved insufficient, a " Dooars " siphon was constructed on similar lines but with four times the capacity. Two of these siphons were installed in a channel 8 ft. wide. They were raised about 3 ft. above the bed of the channel in order to form a large reservoir. They discharged over 1,00,000 gallons of water in half an hour at intervals of 3 hours, and throughout the season no larvæ of *A. minimus* were found within 1½ miles below the dam. The use of these siphons should be of great value on estates which abut on land outside their jurisdiction, since breeding of *A. minimus* could then be prevented by flushes originating on the estates. The cost of constructing and installing the siphons is discussed ; for two siphons this was approximately the annual cost of oiling a channel (where breeding is now being controlled by flushing) so that recurrent expenditure is more or less eliminated.

—*The Review of Applied Entomology, 1941*, 1940.

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